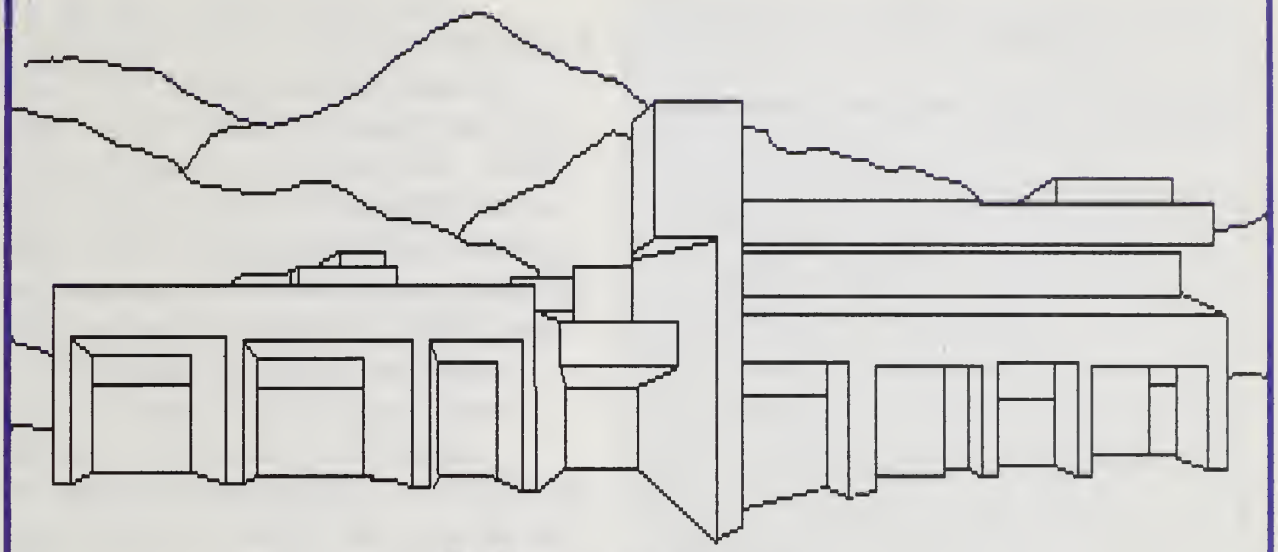
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Montana Natural Resource Information System

Fiscal Year 1995 Annual Report

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NRIS

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Introduction

The Montana Natural Resource Information System (NRIS) was formed in response to the growing need for quick access to the increasing amounts of natural resource information. NRIS was designed **to be a comprehensive program for the acquisition, storage, and retrieval of existing data relating to the natural resources of Montana.** In 1985, NRIS began by providing services through its Montana Natural Resource Index and the Montana Natural Heritage Program. In response to growing user needs, the program has expanded to include the Montana Water Information System and the NRIS Geographic Information System.

NRIS Mission Statement

The Montana Natural Resource Information System provides comprehensive access to information about Montana's natural resources to all Montanans through the acquisition, storage, retrieval, and dissemination of that information in meaningful form.

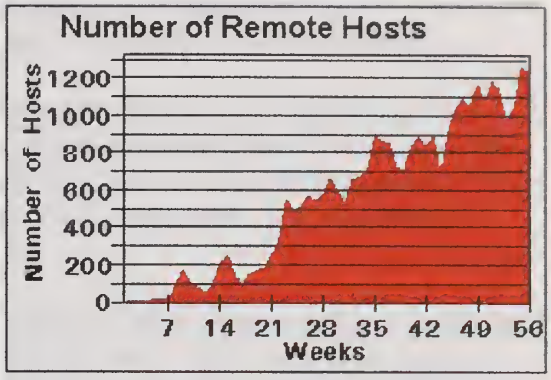
Over the years, NRIS has strived to meet the growing information needs and challenges of Montana's governmental agencies, private business, and general public by developing new services. NRIS now offers a wide variety of data management, information indexing, and data retrieval services.

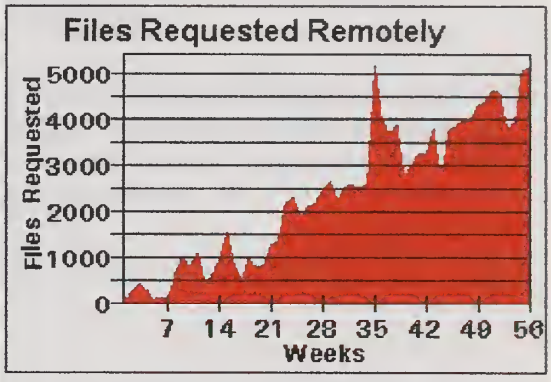
Fiscal year 1995 was a busy time for NRIS. We filled over 2300 requests for natural resource information and services. The **Natural Heritage Program** responded to over 1360 requests; the **Water Information System** responded to over 500 information requests; and the **Geographic Information System** responded to nearly 460 service and information requests.

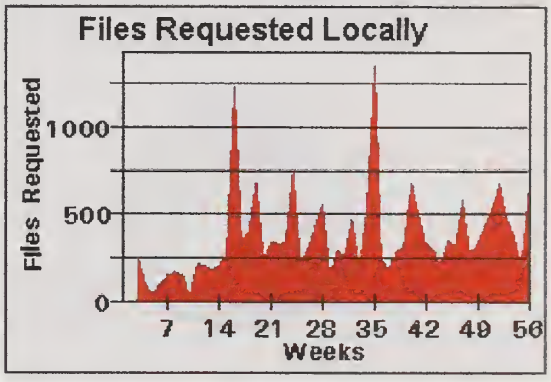
Specific program accomplishments are described in each of the program reports on the following pages. Also included are request statistics for the year and an organizational staff chart.

NRIS On the Internet

Perhaps the biggest change in NRIS during FY 1995 was our accomplishments in establishing an Internet presence. NRIS began by implementing a File Transfer Protocol (FTP) server. The FTP server allows patrons to electronically download data and files directly from our server to their computer via the Internet. NRIS also established new electronic mail services for all of the staff. These E-mail accounts enable rapid communication with a large number of patrons around the state and around the nation. NRIS also established a Telnet server that allows remote log in to the NRIS network. This service is particularly effective when working to debug procedures or computer programs with people outside of the building or to allow remote access by NRIS staff.







The most visible Internet service we established is our World Wide Web (WWW) site. The WWW site consists of a "Home Page" that describes the overall program and provides hyper links to other pages that provide details on all of NRIS's services and as well as access to natural resource data. An average of over 1,000 users a week now log into the NRIS Web site. At right is a chart depicting the growth of the NRIS Web service.

NRIS GIS program also instituted a Wide Area Information Service (WAIS) server. The WAIS server allows a remote patron to search our GIS database for data, retrieve information documenting the data, view a sample of the data on-line, and then retrieve the data directly to their computer. The implementation of the WAIS server was part of a grant NRIS received from the Federal Geographic Data Committee. The purpose of the grant was to create a Montana node of the National Spatial Data Infrastructure (NSDI). The NSDI includes a clearinghouse for locating and obtaining spatial data. Montana was the first state in the nation to implement a NSDI node.

National Spatial Data Infrastructure
National Geospatial Data Clearinghouse
Montana State Library Node

In Appendix C are several printouts illustrating the computer screens at the NRIS Web and WAIS sites.


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NRIS Highlights

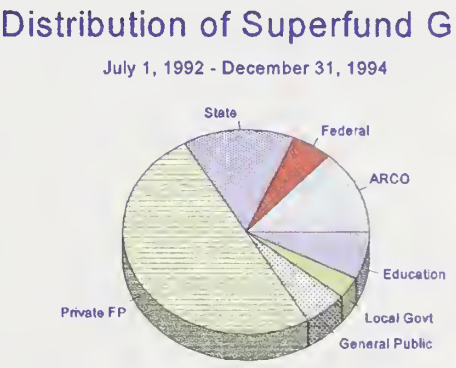
Detailed reports for each of the NRIS programs are contained in the following pages. This section provides a quick overview of some of the program's highlights during FY1994.

The Water Information System (WIS) coordinates the Drought Monitoring Program, a special effort to track snow pack, precipitation, surface water, and soil moisture conditions statewide. Drought Monitoring maps and charts are critical decision-making tools for the Governor's Drought Advisory Committee, and for citizens as they plan for, and respond to, recurring drought conditions in our state.

The Montana Natural Heritage Program (NHP) has provided in-depth assessments for highway projects to Montana Department of Transportation (MDT) planners. This information and assistance has allowed MDT to identify conflicts and sensitive areas early in the highway planning process, thereby avoiding expensive delays and litigation.

The Natural Heritage Program has worked extensively with the Coal and Uranium Bureau at the Montana Department of State Lands in their mine permitting, monitoring and reclamation efforts. This assistance has greatly facilitated the review process for new mines and provided a credible basis for monitoring operating mines and reclamation efforts.

NRIS operates a Geographic Information System (GIS) to support the remediation of the upper Clark Fork Superfund sites. The primary output of the system is maps. Some of the maps are simple basemaps depicting various physical features, and some are the results of complex spatial analysis. One of the critical roles for NRIS is to manage the vast amounts of maps and map data used by the large number of Superfund participants. All parties involved in the cleanup--EPA, DHES, ARCO, private contractors, citizens' organizations, and private individuals--have full access to the system. In the last two and half years, NRIS has filled over 655 Superfund information and service requests for 150 individual people. Those requests resulted in over 1,100 data transfers; composition of more than 800 maps; and the printing of over 8,000 copies of maps. Chart 3 displays the distribution of these individuals.



During the summer of 1994, NRIS's Geographic Information System and Water Information programs created maps of the Big Hole Basin showing general hydrologic features, and points of diversion and place-of-use from the DNRC Water Rights data base. These maps were used to help citizens, the Legislative Water Policy Committee, and the Governor's Office discuss, and help resolve, water availability issues in the basin. The maps were presented in a public meeting and field trip of the basin in June 1994.

Water Information System

Overview

During 1995, the Water Information System staff made great strides in fulfilling the mandate to provide users with the best sources of water information. Major progress was made in offering direct online access to water data and in increasing the number of information sources available through the Water Information System. Enhancement of the Water System service was possible as a result of NRIS expanding its local computer network and acquiring access to the Internet. These changes dramatically improved the way information is transferred from various sources to the Water Information System and to the end users. As a result, the number of users accessing and obtaining water data directly from the Water Information System has increased dramatically during this period. Progress continues to be made in expanding the use of GIS technology for water resource applications both within the Water Information System and on behalf of water information users. Water Information staff also promote and use the GIS as a tool to help improve statewide water information management and inter-agency coordination. The success of this promotion is reflected in the steady increase in requests for service contracts to the GIS component of NRIS for watershed and water resource management applications.

Information Requests

About 514 individual requests for water data and information were processed by Water Information staff during 1995. This represent a slight decrease in the number received by phone and walkin patrons for the previous year. However, through the Internet, the Water Information System processed about 2,500 requests which represents a phenomenal increase in the total number of requests processed in the previous year. There is a tremendous advantage to offering Internet access to water data, primarily that the users can serve themselves and the staff can focus their attention on servicing requests that require more direct intervention on behalf of the user. Internet helps to maximize service to users and staff efficiency. Of the 514 non-Internet requests, approximately 40 percent came from state agencies, 10 percent were from federal agencies followed by private-for-profit users at 16 percent. Private non-profit user requests represented 13 percent of the total requests. Users in the "other" category, primarily academic, local and county government, accounted for about 21 percent of the requests. Among state agencies, DNRC continues to use the System the most, followed by DHES, DSL, FWP, and DOT. The patterns of sector and agency remain consistent with historical usage. Statistics for determining the pattern of use from Internet users are not discussed here but are presented in the general introduction from the NRIS Director.

Computer resources for the System were improved with the transfer of a SUN workstation to Water operations. The workstation is an older model that was retired from use within the GIS program but it has substantial multi-tasking capability and represents a positive addition to the Water Information System and facilitates increased use of GIS for water information operations.

Program Outreach

Outreach to potential System users continued to be a high priority and was greatly enhanced by implementation of access to Internet and the expansion of the NRIS computer network. Outreach efforts using Internet are described in detail below under "Access to Internet." Traditional outreach activities were maintained during the period and include providing

presentations and poster presentations at meetings and conferences, providing tours of the Water Information System and NRIS, placing factsheets and information sheets in public libraries around the state, and by placing electronic versions of the factsheets on electronic bulletin board systems (bbs) and on Internet. Considerable effort was focused on updating various agency- and legislative-level advisory committees on improved GIS and Internet technologies and their potential application to water policy, decision making, and resource management applications. Outreach efforts have been successful as indicated by increase Water System use on all levels.

Water Related Coordination Committees

Advising committees on water information policy continued to be an important and valuable activity. The committees are an effective forum for tracking statewide operations of other state and federal agencies and for keeping appraised of laws and policies effecting water resources. The committees also provide solid opportunities to inform staff from the Governor's Office, Legislator, and state and federal agencies about the Water Information System status and services. The Water Information Coordinator is the lead NRIS staff for these reporting activities.

Legislative Water Policy Committee: This Committee met about nine times during 1995 and the Water Information Coordinator attended the majority of the meetings. The Coordinator provided updates on the Water Information activities, services, and refinements. Updates were also provided by the Coordinator on Drought Monitoring and its GIS map products, and on Ground Water Assessment Programs. The Water Coordinator is the Chairman of the Committee that oversees Montana Ground Water Assessment Program.

Environmental Quality Council (EQC): The EQC met eight times during 1995 to review and study a variety of issues related to natural resources. The Water Information Coordinator attended most of the meetings to provide updates on the Water System, Drought Monitoring, Ground Water Assessment, and other water information issues. The Water Information Coordinator continued to discuss with EQC staff concerning the use of water data, GIS and ArcView2 for supporting Committee discussions, questions and decisions on statewide water policy issues.

Ground Water Assessment Steering Committee: NRIS's Water Information Coordinator chairs this Committee. As noted in the 1994 report, the Ground Water Assessment Act programs experienced a serious funding short-fall in 1994 due to lower than expected revenues to the Resource Indemnity Ground Water Assessment Trust RIGWAT, and due to an error in the Metalliferous Mining Tax law. As a result, there were personnel layoffs and a total stoppage of field work. Efforts to restore funding were successful and continued into the following year. The budget shortfall required the Ground Water Assessment Steering Committee and Montana Bureau of Mines and Geology (MBMG) staff to spend a substantial amount of time re-planning field program goals and revising project budgets. By the end of FY 95, project work was proceeding as planned. The time commitment to the Ground Water Assessment Committee and programs for the Water Information Coordinator was substantial during the period. However, the time and effort are worth the investment judging by the level of interest from the Governor's Office, the Legislature, State and Federal agencies, and citizens. All of these parties are interested in maintaining the GWAA programs for the long-term. The effort is also valuable from the standpoint of improving the availability of current and accurate information on Montana's ground water resources.

Water Resources Coordination Committee: Five meetings were convened during 1995. The Committee has making progress in shaping the general approach to watershed planning and

inter-agency coordination. The Water Information Coordinator and the NRIS Director provided several presentation to advise the Committee on the status of Internet access, Water Information System capabilities, and on the applicability of GIS to watershed planning applications. The Water Information Coordinator presented a plan for using the GIS to create GIS data layers and maps of individual watershed and to map water related projects by watershed and on a statewide basis. The Committee took the proposal under advisement and is working through the DHES, not the Department of Water Quality (DEQ) to find funding for the effort.

Internet Access

Access to Internet was established late in FY94. The Water Information System utilized Internet to greatly enhance the capability of the System to serve users, increase the number of water data sources, transfer water information accurately, and to communicate with other information services nationwide and worldwide. In addition, the Water Information staff initiated providing access to its own data and information sources over the World Wide Web (WWW). Lists of data sources and services were placed on a Water Information page that can be accessed and viewed by users worldwide. The page provides access to information on weather, climate, surface water, ground water, water chemistry, geology, seismology, and other water/natural resource related information. The page also provides an easy way to view and download graphic images of maps including current and historic drought monitoring maps and charts. The Water page also provides active links to other sources of water data including the Montana office of the U.S. Geological Survey (USGS). In the near future the USGS page will offer access to real-time streamflow information. Internet also provides a means of transferring information at rates that are many times faster than conventional modems. This created the ability for Water Information staff to send large data sets quickly.

Electronic mail available on Internet has enhanced communications for the Water Information System staff. The Water Information Specialist and Coordinator can now have routine contact with other water information providers nationwide and with data users. This service has been particularly useful for refining the Drought Monitoring effort by establishing routine contacts with researchers and data sources at institutions like the National Drought Mitigation Center in Lincoln, Nebraska, and the various regional climate centers throughout the U.S.

One of the most profound changes Internet has had is reflected in the number of users that began accessing the Water Information System once the Internet connection was established. On the average about 600 to 800 users access NRIS information, including water information, each day. Between 150 and 200 access the Water Information page each day. The users serve themselves, that is they attach to the NRIS WWW site, browse map and water data, and initiate downloading of the data to their local sites without the direct assistance of Water Information staff. As a result, staff can focus on serving those users with special needs or without Internet access. The bottom line is that Internet has greatly increased the number of users the Water Information staff can serve each day and this represents an effective use of new technology and personnel resources to serve the water information users.

Projects Overview

Montana Rivers Information System (MRIS): Updates of the MRIS were continued during the reporting period. Users of the MRIS were notified of the availability of the updated MRIS and a new effort to track users was initiated. MRIS data continues to be requested frequently and the data base continues to be one of the primary sources of river related information.

Montana Drought Monitoring: In 1995, Montana experience normal and above normal precipitation. The Drought Monitoring maps were useful to resource managers but the need for close tracking of "drought" conditions did not materialize. Efforts during the period focused on improving out reach and information dissemination to the public through the news media, particularly through television. The Water Information Coordinator provided several presentation to the press, and assisted the Lieutenant Governor in a presentation to the Montana Broadcasters Association. The Water Information System also purchased hardware that makes it possible to place computer generated maps onto video tape for use on TV. Additional plans were made to simplify Drought Monitoring maps to improve how they appear when viewed on television. Improved outreach to the public via the press will start during the 1996 monitoring season.

A decision was made by Montana State University to close the Montana Climate Center (MCC) which supplies the PDSI data to the Water System for mapping. The Water Information Coordinator scheduled several meetings with MSU Administration to encourage MSU to keep the MCC operational. If this effort is unsuccessful, the Water Information System will assume all of the data dissemination tasks currently performed by the Center. In addition, calculation of the PDSI, or a replacement index, may be assumed by the Water Information System. The new responsibilities would be assumed during FY96.

The Water Information Coordinator was asked for a second time to provided facts concerning the Monitoring System, status of the Climate Center at MSU, and the need to modify the Palmer Drought Severity Index to the Montana Water Research Center and the Office of Senator Conrad Burns. A renewed efforts is being made to find additional funding for the Climate Center and Drought Mitigation support. Status of this second effort is unknown at this time.

Montana Ground Water Atlas: The Atlas is a final stage of editing after two thorough rounds of peer review. Publication is slated for October or November of 1995. After publication, Water Information staff will focus efforts on creating an electronic version of the Atlas to be made available over the internet and as a stand-alone electronic document.

Volunteer Water Monitoring: The grant proposal to fund this effort was successfully funded by EPA. However, the Montana Legislature placed restrictions on how the Department of Health and Environmental Sciences (DHES) could disburse the EPA funds. DHES is attempting to meet the Legislatures requirements and as a result, the project startup has been delayed.

The Water Information Coordinator was also requested to speak at the National Volunteer Water Monitoring Conference in Portland, Oregon. The presentation was entitled "Using GIS to support Volunteer Water Monitoring." The proceedings were published in March, 1995. The Coordinator was also asked to submit input to another article on the use of GIS for assisting volunteer monitoring efforts and to review another related article on water data.

Geographic Information System

Overview

During FY95, the NRIS GIS program continued providing a diverse array of products and services to Montana's GIS community. Some services were the traditional mediated services where we assist GIS users on an individual basis. Some services were new networked based services where we publish information on the Internet that patrons can access themselves.

As GIS technology matures and becomes more integrated into organizations, the demand for analytical applications has been increasing. As one of the leaders in the use of GIS technology in Montana, NRIS GIS is asked frequently to assist in developing major GIS analytical applications. This year, we undertook three major analytical projects: two for the US Forest Service and one for the Department of Health and Environmental Services These projects are detailed under the *Projects Overview* section of this report.

With the maturing of our Internet services during FY95, the way NRIS GIS conducts business is fundamentally changing. We now have an increased ability to invest time and resources in building an information infrastructure that permits us to publish data and information that can and is accessed by many users. After we publish data and information on the Internet our patrons can access the information at their convenience and without impacting NRIS GIS staff. This allows us to meet the needs of a much larger community and frees up resources to provide a higher level of service to those who need it.

During FY95 we filled 466 total requests and developed 5803 products through our mediated services. This number represents a decline in total requests for mediated services over FY94. However, we also provided information through an additional 22,919 patron sel service accesses. Thousands of maps, documentation, and databases were acquired from our Internet servers. Also, some of our larger analytical projects require a significant amount of effort but only show up as one or two requests.

We intend to continue to enhance our Internet services during the upcoming year to provide our patrons with easy, efficient, methods to identify and acquire the information they need.

The tables below summarize GIS products and services provided during the last two fiscal years.

FY 1995 Mediated GIS Services Summary

Total Requests	Maps	Reports	Programs	Data	Other	Total Products
466	4502	45	33	1065	158	5803

FY 1995 GIS Services Summary

Total Requests	Maps	Reports	Programs	Data	Other	Total Products
598	5695	111	37	1053	57	6953

Internet Services

Use of Internet services provided by NRIS GIS exploded during FY95. Currently patrons who are on the Internet can access the GIS program to find general information or to access selected map graphics, documentation, and databases. These services have been implemented by installing a World Wide Web (WWW) server and "Home Page", a Wide Area Information Server (WAIS), and an "Anonymous FTP" site on the GIS computer network. Use of the Internet services has grown steadily since their inception. We started collecting statistics on Internet usage in August of 1994 and since then there have been 22,919 accesses of the GIS Web Services. Currently over 500 users access GIS services from NRIS in an average week. Plans call for expanding the number of databases on the Internet servers and developing new interfaces and indexs to facilitate access.



GIS WEB Home Page

Montana GIS Users Group

NRIS GIS plays an active role in the Montana GIS Users Group. The user group is a non-profit consortium of government agencies and business involved with GIS technology. The main activities of the Users Group are an annual conference and publication of the *Montana GIS News*. The *Montana GIS News* is designed to facilitate the transfer of information about GIS data, activities, and projects in Montana. The newsletter is published by NRIS for the Montana GIS User Group.

The annual Montana GIS User Conference provides an opportunity for individuals interested in GIS to share ideas and experiences. The 1995 Conference in Helena attracted over 300 people. NRIS helped with the conference by providing administrative support, actively participating on planning committees, hosting workshops, and making presentations. NRIS also hosted a Public Night where members of the local community had an opportunity to learn about GIS.

A major effort undertaken by the User Group this year is the establishment of endowed scholarships at both major Montana Universities. The scholarships will assist students pursuing studies related to GIS. The goal is to have a $10,000 endowment at Montana State University by 1997 and at the University of Montana by the year 2000. The endowments should provide $500

per year in perpetuity. Fred Gifford and Kris Larson both serve on the GIS Users Group board of directors.

Montana Interagency GIS Technical Working Group

The Montana Interagency GIS Technical Working Group (TWG) is a forum for the exchange of information regarding the acquisition of new GIS data, the existence of current GIS data, and the status of new and on going GIS projects. The TWG also promotes and develops standards and procedures related to GIS. NRIS supports the TWG by providing administrative support and by actively participating in meetings and sub-committees. Major activities for the TWG during FY 1995 were associated with implementing a grant from the Federal Geographic Data Committee (FGDC). The grant was to promote use of the Internet for data sharing and cooperation among GIS users in Montana. NRIS was the lead agency responsible for the grant implementation. Tasks completed included:

Develop Implementation Plan - The implementation plan is the guiding document directing efforts in pursuit of the goals approved by the TWG. The plan included tasks to be performed under this grant and tasks to be accomplished outside the grant project.

Update and Enhance the Montana GIS Data Directory - The *Montana Data Directory* is PC-based application that allows users to query information about GIS data and projects in Montana. Under the grant we evaluated converting existing *Montana GIS Data Directory* entries to meet the FGDC Metadata Standard but found it unworkable. We then decided to survey the GIS user community about their GIS holdings. This information is being converted into a format accessible on a WAIS server and can be accessed via the Internet.

Implement One Node on the FGDC Clearinghouse - A WAIS server with documentation about NRIS GIS databases was implemented on the existing NRIS system. Since the major infrastructure was already in place, the primary work required under this task was installing and configuring the WAIS software and converting the existing documentation to the correct structure. We also placed some high-interest GIS databases on the WAIS server.

Develop Tools for Documenting Data to the FGDC Metadata Standard - NRIS GIS developed software tools for documenting data to the FGDC standard. This interface is implemented in Arc/Info. NRIS uses this tool for documenting all its' GIS holdings. The software will also be made available to any other sites interested in using it to document their own databases.

Research and Identify Tools for Searching for Spatial Data on the Internet - There are many tools available for searching the Internet and new tools are continually developed. We have identified as many of these tools as possible so that we may provide them or information about them to GIS users in Montana.

Update the Montana GIS Standards Plan to Comply with FGDC Metadata Standard and the Spatial Data Transfer Standard - The *Montana GIS Standards Plan* was developed by the TWG to facilitate data exchange among agencies by ensuring consistency in the development and documentation of GIS data bases. Topics covered in the *Plan* include: source materials, data automation, accuracy, documentation, and data transfer methods. Under the grant, the *Montana GIS Standards Plan* was revised to adhere to the FGDC Metadata Standard and the Spatial Data Transfer Standard.

Implement a Montana GIS Users List Server on the Internet - List servers allow Internet users to send an e-mail message to one address and have it broadcast to many others interested in that topic. The University of Montana implemented the Montana GIS List Server to facilitate communication among the Montana GIS community.

GIS Seminars

For the past five years, the NRIS GIS Program has offered a series of GIS Seminars. The seminars are held once a month throughout the fall, winter, and spring. A GIS expert typically gives an hour long presentation to a wide variety of GIS users from governmental agencies and the private sector. The topics of the seminars range from software specific technical tips and tricks to general information about topics such as cartography or new GIS projects in the state. At the request of the GIS Users' Group, NRIS also sponsored a half-day workshop in 1995, *Understanding and Using Map Projections*, by Gerry Daumiller. Other Seminar Topics for the 1994-95 season included: M*ontana's Public Lands and Private Preserves - On the Ground and in the Computer* by Cedron Jones; *Surfing the Internet for Fun and Profit* by Fred Gifford; *The Milk River Existing Irrigation and Water Rights Evaluation* by Bill Greiman; *Wildlife Distribution Mapping by Fish, Wildlife and Parks: How Far Are We, Where Do We Go From Here* by Gael Bissell; *An Update on the Status of the National Spatial Data Infrastructure* by Allan Cox; and *GIS-GPS and Archaeology - A Pioneering Montana Project* by Peter Langen and Mark Baumler.

GIS in Libraries

Several new libraries joined the "GIS in Libraries" program in 1995 and we are sponsoring new schools in the "K-12 GIS Program " as well. The libraries and schools participating in the project now include: Dennis Richards at the Mansfield Library in Missoula; Cynthia Rooley at the Liberty County Library; Tim Urbanic at the Billings Vo-Tech Library; Bill Mc Gregor at the Citizens Technical Environmental Committee in Butte; Alice Hallstrom, Hot Springs Library; Nancy Brennan, Bicentennial Public Library, Colstrip; Michael Ober at the Flathead Valley Community College; Dennis Brown at Capital High School in Helena; Margy Kernan at Helena High; T.A. Hennard, Corvallis High School; Norma Glock at Columbus High School Library; John Meckler at the Plains High School; Arlie Patton at Billings West High School; Chris Ruffatto at Whiltefish High School; Jon Kaps, Flathead High School Library; and Gil and Marilyn Alexander at Canyon Ferry Limnological Institute. The Montana State Library is also one of the more than 100 participants nationwide in the Association of research Libraries "GIS in Libraries" project.

Training procedures have been working well. Training is offered on-site as the school or library comes on-line. If several libraries come up at the same time, then training may be offered at the Montana State Library. Non-librarians may be offered training at MSL if there is a contract to at least semi-sponsor it.

Pam Smith has been working on a "GIS in Schools and Libraries" section for the Library homepage, NRIS homepage, and GIS homepage. It will include pointers to some of the more exciting data sources, such as the ESRI FTP site and the Bessie project; pointers to our data; Guidelines for becoming part of the "GIS in Libraries" or K-12 Programs; a pointer to the ArcView software and a *unix2dos* software utility. We will also provide information to explain the difference between ArcView and ArcView2.

The 1995 Montana GIS Users' Conference was held in Helena, May 8 - 10. The GIS Users' Group hosted the Fourth Annual Public Night in conjunction with the conference. As always,

poster presenters and vendors were available to show their work, share ideas, and answer questions. Allan Cox gave the annual presentation which explains GIS in lay terms, and described some of the GIS projects affecting the state, and computers were available for the public to see and use. But for the first time, we invited local schools to participate. There were special demonstrations, computers, and mini-workshops set up for the K-12 crowd. About 30 students participated in the event.

In the fall of 1994, the unix workstation in the reference section of the state Library was replaced with a PC to help make user access easier. Particularly, with the release of ArcView 2, the PC was not powerful enough to view and use the data accessed by ArcView in a reasonable time frame. MSL now has a more powerful laptop PC with a permanent port into the MSL network.

Projects Overview

Department of Health and Environmental Services - Clark Fork Superfund Project: The Clark Fork GIS (CFGIS) continues to be the largest project for NRIS GIS. The system, in place since 1988, is at full maturity. Traditionally, map products have been the primary product produced by the CFGIS. This trend continued during FY95 with 2,766 maps delivered. As the system develops and more analytical data are made available by the Clark Fork Data Management System (CFDMS), the GIS has been used for more analytical uses. Some example analytical tasks completed this year include:

Create map depicting groundwater quality using Stiff diagrams. Import groundwater quality data for Milltown area. Run AML program for producing Stiff diagrams. Design map depicting Stiff diagrams and miscellaneous basemap features.

Calculate volume of tailings for buffer around Silver Bow Creek. Map areas where tailings are less than two feet above ground water and where tailings are more than two feet deep, where tailings are less than two feet deep, 100 year floodplain, haul roads, and tailings repositories. Figure volume of tailings greater than and less than two feet deep within 50 feet of Silver Bow Creek. Figure volume of tailings that are more than two feet below the ground. Figure volume of tailings more than two feet below the ground where tailings are more that two feet above the ground water.

State Historic Preservation Office: GIS staff worked with the State Historic Preservation Office (SHPO) to develop a database for a major project they have on the Flying D ranch in southwestern Montana. The project tasks completed this year included database development, map production, and analysis. Specific tasks included:

Development of ranch wide 1:64,000 basemaps, and a 7.5 minute, 1:24,000 basemap series for the ten quad ranch area. These maps have been used for displaying site and IA data;

Importation of 7.5 minute Digital Elevation Model (DEM) data for nine of the ten quads covering the ranch area (DEM for Norris NE quad is not available). The data have been used in the construction of several contour coverages and in viewshed analysis;

Use of the 7.5 minute DEM in a solar radiation study for the Cherry Creek Canyon quad. A series of maps and graphs showing base data and solar radiation indices for various times of the year were created for the study;

Linkage of the SHPO SITES database and the SHPO SOURCE database to the GIS database. These linked databases have been used for the spacial analysis of artifact types, raw materials and source areas;

A total of seven days were spent in the field collecting GPS points and polygons for archaeological sites, artifacts and features, such as tipi rings. This year the GPS field work was fully integrated with the standard surveys conducted by the State Archaeologist.

U.S. Forest Service: The GIS program worked on several projects with the US Forest Service (USFS) during FY95. For the Helena National Forest we assisted with revisions of an Environmental Impact Statement (EIS) for oil and gas development on the forest. The EIS required the combining of 50 GIS databases in different combinations to develop criteria for evaluating seven development alternatives. NRIS GIS staff developed the GIS processing steps required to complete the EIS and designed and produced the maps used in the final report.

For Region 1 of the US FOREST Service, NRIS GIS provided technical support for the Columbia River Basin Assessment (CRB). The CRB project was in response to a directive from President Clinton to the USFS to develop an ecosystem based strategy for management of forests east of the Cascades in the interior Columbia River Basin.

NRIS GIS contracted with the US Forest Service to provide GIS consulting and analysis to support the CRB project. Work on this project included assimilating GIS databases, designing processing and analysis steps, and performing the processing to support watershed classification and modeling of the entire Columbia River drainage basin.

Because of the large geographic extent of the project area and the relatively large scale of the GIS databases being processed this project was a very large data processing task. Once the processing steps were finalized NRIS GIS staff spent eight weeks, running five UNIX workstations, 24 hours a day, seven days a week to complete the analysis.

Montana Department of Fish Wildlife and Parks: NRIS provided several services to FWP in FY95. Included were:

River Reach Database Development: - Under contract with the Fisheries Division NRIS completed development of a statewide Geographic Information System (GIS) river reach database. This database provides the vehicle for managing and analyzing environmental, natural resource, and management information associated with surface water features.

Major tasks undertaken as part of this project were: indexing the river reach database to the Montana Rivers Information System (MRIS) database; organizing a River Reach Technical Working Group to set directions for database development and pursue joint funding opportunities; and developing procedures for completing enhancements of the river reach database.

Technical Support: NRIS provided the Kalispell office assistance in using GIS software and hardware during the period. NRIS also provided access to its' electrostatic plotter for producing large color printouts of maps developed by FWP staff on their GIS system.

Department of State Lands: NRIS worked with two DSL bureaus during FY95. Projects included:

Coal and Uranium Bureau: During FY 1995, the GIS provided various services in support of the Department of State Lands (DSL) Coal and Uranium Bureau GIS. GIS staff continued to supply technical support to DSL GIS staff as requested. Technical tasks completed included assistance with loading new releases of GIS and UNIX operating system software. NRIS also provided administrative support and paid for the DSL UNIX and GIS software maintenance agreements.

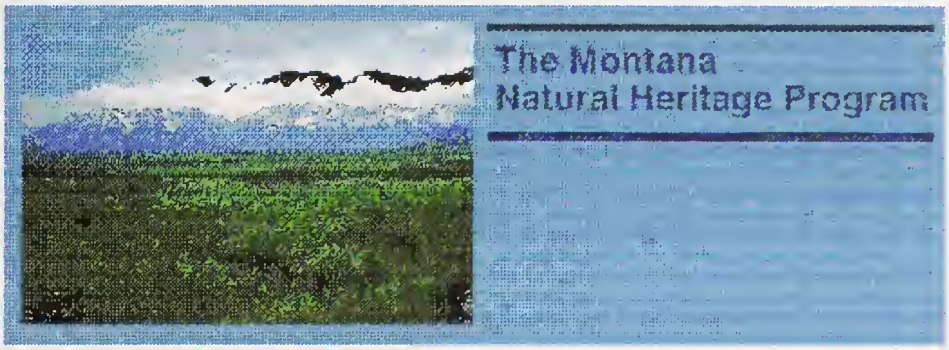
Abandoned Mine Bureau: NRIS GIS staff developed programs and procedures to automate the development of 230 mining district maps. The maps were composed of US Geological Survey 1:100,000 scale basemap data, DSL mining district layer, and the NRIS US Forest Service ownership layer. GIS staff combined the data layers and hand placed annotation to create the 230 individual maps. Hardcopy and electronic versions of the maps were delivered to DSL.

Natural Resource Damage Claim: NRIS GIS provided various GIS services under contract to the Natural Resource Damage Claim (NRDC) in the Montana Department of Justice during FY 1995. Tasks completed included map design, database development, and analysis. NRIS also supplied NRDC contractors with various databases for their use.

Department of Health and Environmental Services - Air Quality Division: NRIS GIS supported DHES staff with mapping and analysis of project areas in Whitefish, Billings, and East Helena. For the Whitefish area we acquired data from the Montana Department of Transportation and the US Census Bureau in order to develop reports and maps about traffic and population densities on a one kilometer grid. For the Billings and East Helena areas we developed basic maps for use in reports.

Natural Heritage Program

Overview



Data requests and the service sector of the program continue to increase. During 1994 the Heritage Program responded to 1360 data requests, a 63% increase over the previous year. This marks the 5th consecutive year of significant growth in service demands on the program (average =51%). Database growth has continued with results from Heritage staff and collaborators (primarily U.S. Forest Service personnel) contributing significant new information on the state's biodiversity (see individual reports of Botany, Community Ecology, and Zoology below). Total database records now equal 21,666, a 25% increase over 1993.

The mapping and entry of the new data, maintaining the currency of the existing information, and keeping pace with the large number of requests for data required additional assistance for the Data Management staff. Debbie Dover, our student intern for 2 years, has joined the program full-time since graduation from Carroll College. Debbie will continue with the program until fall of 1996 when she leaves for medical school. The highly motivated and eclectic Data Management staff is headed by Margaret Beer, John Hinshaw - Environmental Information Specialist, Cedron Jones - GIS Specialist, Kathy Jurist - Special Projects Information Coordinator (see section below for more details).

We are expanding our emphasis and developments into the access and delivery of information. A pilot project will be initiated between The Nature Conservancy and the National Biological Service to develop effective means of access and transfer of biological information across the Internet - allowing greater availability of information while safeguarding sensitive resources. Results of this project will be applied in other states as their data management and Internet capabilities allow. Linkages with GIS and development of new databases and systems, described below, have continued to allow us to stay abreast with the rising demands for information on biodiversity and land management.

Melony Bruhn has joined us as Administrative Assistant, providing administrative support, contract management, and accounting and budgeting assistance to Dave Genter and staff. This position has been possible through contract funding, most recently the Columbia River Basin assessment. The CRB project will come to a close in September 1995.

Federal challenge cost-share projects continue to provide a significant opportunity to conduct *de novo* field surveys and produce conservation strategies for some of Montana's rarest species and communities. Heritage Botanists Bonnie Heidel and Steve Shelly will be heading a team of scientists to draft the recovery plan for Water Howellia (*Howellia aquatalis*). The U.S. Fish and Wildlife Service requested the Heritage Program to complete the technical draft, based on our previous studies and experience with the species.

DATA MANAGEMENT: *Acquisition, storage, manipulation, and retrieval of information for project planning and research*

The Heritage Program conducted significant research and inventory projects during the year, incorporated the results of these projects into its database system, and continued to provide information services to state and federal agencies, county and local offices, private consulting firms and academic and foreign requestors.

Over 1,300 data requests were answered in FY 1995: an average of more than 100 requests per month and an increase of approximately 63% from FY94. This figure includes requests placed by U.S. Forest Service staff in Region 1 via a subset of Heritage data available on their mainframe system.

Response time continued to be under five days for all but the most complex requests. Information on sensitive species in the vicinity of planned projects or development was the most frequently-received type of request. A heavy user of the program was the Department of State Lands: we regularly reviewed opencut mining applications and alerted the agency to any species of special concern in project areas. The number of highway projects from the Montana Department of Transportation declined somewhat but continued. Local weed cooperatives also became aware of our services, and we regularly provided species information within coop districts.

GIS is now an integral part of data queries and responses: we are able to easily search large areas of the state, stream or highway corridors, or irregularly-shaped project areas, and accompany resulting printouts with maps.

The Internet is also becoming a tool for providing service to patrons. Frequently requested data sets are now posted and accessible by anyone with Internet capabilities. E-mail is becoming commonplace for transmitting files and messages. Large data sets can now be transferred using FTP (file transfer protocol). All of these capabilities mean faster, more efficient service for requestors.

Database growth was substantial. Distribution, phenology and description fields were completed for approximately 400 plant species, 2,000 additional literature sources were abstracted and entered, and the program has completed summary taxonomic records for nearly all vertebrates and vascular plants that occur in the state. Work also began on compiling status information on some of Montana's lesser-known invertebrates and non-vascular plants. Additional information on areas in Montana under special management (e.g., national forests, research natural areas, wildlife refuges) was collected and digitized: the Heritage Program has the most comprehensive data set of this type in the state. Database maintenance also requires deleting records: approximately 200 species location records were copied out of the system, generally because of changes in species status (i.e., a species is more abundant than previously thought).

ZOOLOGY: *Research, Monitoring, Inventory, and Technical Information Service on Animals*

Results from eight 1994 zoology studies have been written up in reports. Highlights of 12 zoology field projects and other work in 1995 include the following:

Bats were surveyed using new electronic recording devices on the Bitterroot and Kootenai National Forests. Additional surveys were carried out in conjunction with the Department of

State Lands, Abandoned Mine Bureau. Heritage staff participated in a 2-day workshop on the reclamation of mines and conservation of bats, sponsored by DSL.

Surveys for Northern Bog Lemmings were completed in the Garnet Mountains in conjunction with the Bureau of Land Management, Garnet Resource Area. Work was initiated to develop a viability assessment model for this species. This will require further analyses and publication of current projects.

Harlequin ducks, a federal candidate for endangered species status, were surveyed and monitored in the Yellowstone, Blackfoot, Flathead and Clark Fork drainages with mixed results; reproduction ranged from poor to excellent in drainages examined. A conservation assessment and management plan for the northern rocky mountains is nearing completion in conjunction with representatives from Idaho and Wyoming.

A survey on parts of the Lewistown District of BLM was completed for colonial nesting water and shorebirds. Several new Black Tern Colonies were found, but far fewer than had been expected.

Bird banding included white pelicans at Arod Lake and Canyon Ferry Wildlife Management Area colonies and harlequin ducks in the Flathead and Clark Fork drainages. Nine birds marked in Glacier National Park were relocated by the Canadian Wildlife Service on their wintering range on the Pacific Coast of British Columbia and one bird was seen on the coast of Washington.

Amphibians and reptiles were surveyed on the Helena, Kootenai, Bitterroot, and Custer National Forests. Results indicate Leopard Frogs have undergone a dramatic decline in western Montana in the past 30 years and may be declining in parts of eastern Montana as well. Western Toads also seem to be declining. Amphibians and reptiles of Montana were featured in a 20 page Montana Outdoors article (spring 1995) prepared by NHP and Fish, Wildlife and Parks personnel. We held 5 workshops on identification of Montana's reptiles and amphibians for various groups.

Mollusks, perhaps the most endangered group of animals in North America, were surveyed in Northwest Montana. Results are pending expert verification on species identification. It appears that western Montana has few species of aquatic gastropods and their distribution seems to be patchy.

We continued our work with the Partners in Flight Steering Committee, the Harlequin Duck Working Group, and the Montana Piping Plover Working Group. We are becoming active participants in the Baird's Sparrow Working Group and the Montana Prairie Dog Working Group. These efforts contribute to better coordination of research and management of these species as well as provide more effective means of agency collaboration and data sharing.

The Montana Animals Species of Special Concern list was updated in February 1995. Copies are widely distributed as well as posted electronically on the Internet via the Heritage Program's HomePage (http://nris.msl.mt.gov/mtnhp/nhp-dir.html).

BOTANY: *Research, Monitoring, Inventory, and Technical Information Service on Rare Plants*

Results from twelve 1994 botany studies will be written up in reports and are highlighted below:

General sensitive species surveys were conducted in the Ashland District of Custer National Forest, an area of the state that is not well known. Two new additions to the flora were found, Barr's milkvetch information updated, and other species thought to be rare found to be common.

Status surveys of moonworts were conducted across the Kootenai National Forest. These ferns pose special study questions because they often occur in "swarms" of multiple species in a place. They pose special management questions that the status evaluation addresses.

Pollination and genetic research on Spalding's catchfly (*Silene spaldingii*) were conducted which will contribute to a rangewide conservation strategy.

Management response studies were initiated for Lemhi penstemon (*Penstemon lemhiensis*) and life history studies were completed.

Text was written on sensitive species of the U.S. Forest Service and the Bureau of Land Management that will be used to produce a statewide sensitive plant guidebook.

The first Montana Rare Plant Conference was held April 26-27, including presentations and workshops. Program agenda was organized by Natural Heritage Program staff and Montana Native Plant Society Members. Over 100 botanists from Montana and adjoining states attended.

The Montana Plant Species of Special Concern list was updated in 1995. We imported information on the vascular flora of Montana (over 2800 taxa) and will be trying to edit it. We also imported the moss flora of the state and initiated a Moss Species of Special Concern list.

COMMUNITY ECOLOGY: *Research, Inventory, Monitoring of Plant Communities*

Much of 1995 was concerned with following up on projects initiated in 1994 and before, including continued participation in the large scale assessment project concerning the Columbia River Basin and surrounding lands. This project necessitated bringing on Tim McGarvey as an assistant ecologist to be in charge of data acquisition regarding terrestrial and riparian plant communities. Tim completed this task in a timely and efficient manner, supplying crucial information to run landscape/succession models and data points against which the various potential and existing vegetation models were tested. The senior ecologist participated in the vegetation modeling as both a facilitator and information source for Montana's portion of the Columbia Basin Drainage. The CRB project underscored the importance of Heritage ecologists as repositories of ecological insight and information regarding a large land area. Information that is not captured by any other portion of management or academic systems is found in our standardized classifications; this standardization facilitated communication and problem solving across state and jurisdictional boundaries.

In the interest of standardization, much time was spent with western region ecologists to find the common factors to classification of riparian/wetland types and especially concentrated on crosswalking of British Columbia's forest community types with classifications from adjacent states.

Natural Heritage Program staff continue to be a major push in the development of ECADS (Ecological Classification and Description System) a software and database program that should have broad applications to various land management agencies concerned with applying the new ecosystem management paradigm. Non-governmental organizations, academic institutions and

research facilities and private individuals can also efficiently use ECADS given the new generation of powerful computers. Cooper and other western Heritage ecologists have been and will continue to be used as Beta testers in the refinement of the system.

The plains area of northeastern Montana and the diverse landscape of southwestern portion of the state have community classifications to be published this fall. These are classifications that treat major and unique land areas and have working taxonomies. That is, there are dichotomous keys to the various community types encompassed by the classification and in many cases descriptions of, and accompanying constancy/cover tables for the community types.

Work initiated by Rob DeVelice and Peter Lesica in the Pryor Mountains vicinity has been expanded upon and field sampling conducted to generate a community types map for the BLM holdings in the area between the Beartooth Escarpment and the western edge of the Pryor Mountains. This map, in conjunction with others generated by other agencies will provide a base layer to be used in management planning and possibly bioreserve design.

Extensive field work was conducted in the Centennial Valley, both on Bureau of Land Management holdings and U.S. Fish and Wildlife Service's Red Rock Lakes Refuge. On the Centennial Sandhills we are attempting to determine the historic role of fire and cattle in maintaining the blowout and deposition areas within the dunes; it is these disturbance areas that are so crucial to the establishment of several rare and threatened plant species/subspecies. On the refuge we conducted a ground-truth survey with the goal of producing a community type map, ostensibly at 1:24,000 scale.

We continue our participation in the Great Plains Initiative as a source of information regarding the mid-grass prairie types of eastern Montana, though in fact this is one area that has been inadequately sampled and analyzed for both botanical and community type diversity. Also in eastern Montana we have consulted for the Nature Conservancy, apprising them of the desirability of conservation for several properties.

Appendices

Appendix A: NRIS Staff for FY95

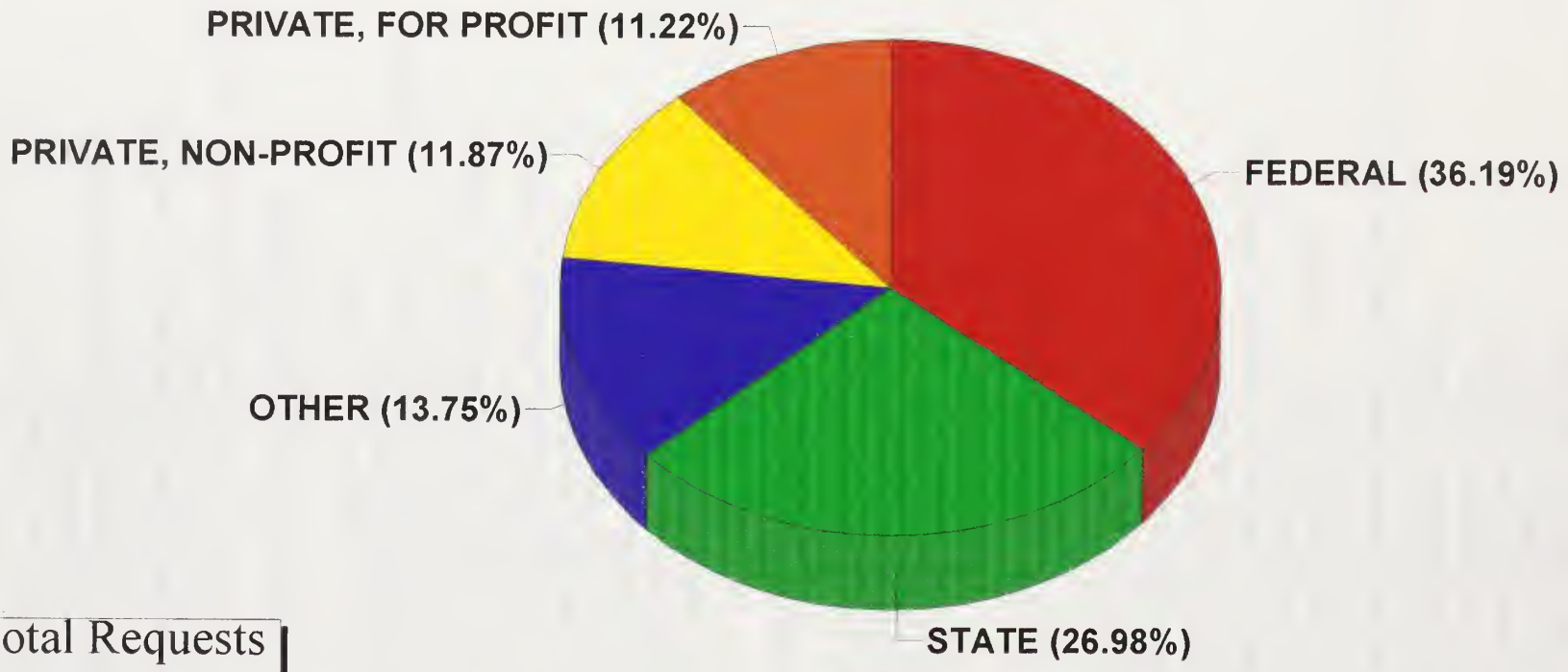
Appendix B: User Statistics Chart

Appendix C: Internet World Wide Web (WWW) and Wide Area Information Service (WAIS) Samples

Natural Resource Information System

Users by Sector

Natural Heritage Program, Water Information System, Geographic Information System



Total Requests
2337

Period of Record: FY 1995

MONTANA NATURAL RESOURCE INFORMATION SYSTEM

Phone: (406) 444-5354 Fax: (406) 444-0581

- Allan Cox, Director.....444-5355
- Email: acox@nris.msl.mt.gov
- Pam Smith, Administrative Assistant.....444-5354
- Email: psmith@nris.msl.mt.gov
- Michael Bloom, Systems Administrator.....444-2987
- Email: mbloom@nris.msl.mt.gov

GEOGRAPHIC INFORMATION SYSTEM

- Fred Gifford, Coordinator.....444-5357
- Email: fgifford@nris.msl.mt.gov
- Gerry Daumiller, GIS Programmer/Analyst.....444-5358
- Email: gdaumiller@nris.msl.mt.gov
- Kris Larson, GIS Programmer/Analyst.....444-5691
- Email: klarson@nris.msl.mt.gov
- Duane Lund, GIS Programmer/Analyst.....444-5371
- Email: dlund@nris.msl.mt.gov
- Peter Langen, GIS Technician....444-0539
- Email: plangen@nris.msl.mt.gov
- Kristina Gurrieri, GIS Technician.....444-5365
- kgurrieri@nris.msl.mt.gov

WATER INFORMATION SYSTEM

- Jim Stimson, Coordinator.....444-5356
- Email:jstimson@nris.msl.mt.gov
- Val Jaffe, Water Information Specialist.....444-3345
- vjaffe@nris.msl.mt.gov

NATURAL HERITAGE PROGRAM

- Phone: (406) 444-3009
- Fax: (406) 444-0581
- Email:mtnhp@nris.msl.mt.gov
- David Genter, Director.....444-3019
- Email:dgenter@nris.msl.mt.gov
- Mel Bruhn, Administrative Assistant.....444-3009
- Email:Mbruhn@nris.msl.mt.gov
- Margaret Beer, Data Manager.....444-0914
- Email:mbeer@nris.msl.mt.gov
- John Hinshaw, Environmental Information Specialist.....444-3488
- Email:jhinshaw@nris.msl.mt.gov
- Bonnie Heidel, Botanist.....444-0536
- Email:bheihel@nris.msl.mt.gov
- Steve Cooper, Ecologist.....444-0231
- Email:scooper@nris.msl.mt.gov
- Jim Reichel, Zoologist.....444-2546
- Email:jreichel@nris.msl.mt.gov
- Tim McGarvey, Assistant Ecologist.....444-0915
- Email:tmcgarvey@nris.msl.mt.gov

- Cedron Jones, GIS Specialist.....444-2817
- Email:cjones@nris.msl.mt.gov
- Kathy Jurist, Special Projects Information Coordinator.....444-2817
- Email:kjurist@nris.msl.mt.gov
- Debbie Dover, Data Assistant.....444-2817

USFS Region 1

- Federal Bldg. P.O. Box 7669
- Missoula, MT 59807
- Steve Shelly, Botanist (WLF).....329-3041
- Steve Chadde, Natural Areas Ecologist (RAWE).....329-3141
- Deborah Richie, Watchable Wildlife Biologist.....329-3291

Go Back


Return to NRIS Home Page



The Montana Natural Resource Information System (NRIS) Geographic Information System (GIS) acts as a clearing house for GIS databases and provides services to State, Federal, Private, Non-Profit, and Public groups or individuals needing access to GIS technology.

Text version of the above imagemap follows.

Montana State Library - Natural Resource Information System
Geographic Information System

What is GIS?
Our GIS Services
GIS News
Montana GIS Users' Group

GIS Data
Montana Maps
Browse our Data List
Search for Data (WAIS)
Other WWW GIS Sites

Montana GIS Technical Working Group

National Spatial Data Infrastructure (NSDI) Tools

Contact:

Fred Gifford, GIS Coordinator (406) 444-5357 Phone
Montana State Library (406) 444-0581 Fax
1515 East Sixth Avenue fgifford@nris.msl.mt.gov
Helena, Montana 59620-1800

Last Revised 8/28/95
gerry@nris.msl.mt.gov

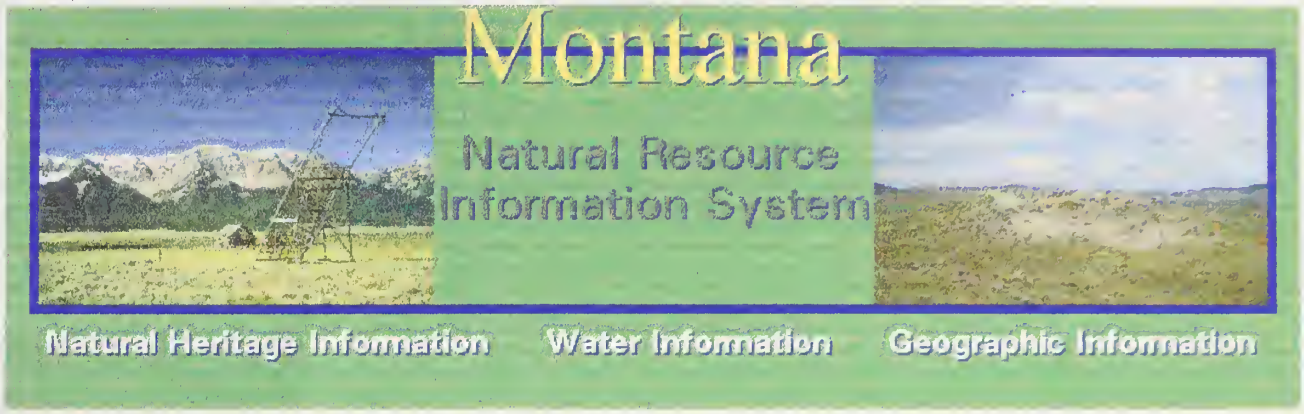


The Montana Natural Heritage Program is part of the **Natural Heritage Network.**

The Montana Natural Heritage Program (MTNHP) systematically collects information on Montana's biological features, emphasizing threatened, endangered, or sensitive (TES) plants, animals, and plant communities. The Heritage Program is a part of the Montana Natural Resource Information System.

- **Animal Species of Special Concern:**
- **Vascular Plant Species of Special Concern:**
- **Vertebrate Species of Montana:**
- **Species and Plant Communities of Special Concern: State Distribution Maps**
- **Species Lists By County: (A Clickable Map)**
- **Database Summary:**
- **Western Regional Heritage Publications: (A Clickable Map)**
- **Staff:**
- **Reports:**
- **Requests:**

Contact: Montana Natural Heritage Program (406) 444-3009
Montana State Library (406) 444-0581 FAX
1515 East Sixth Avenue
Helena, Montana 59620-1800



The Montana NATURAL RESOURCE INFORMATION SYSTEM, located in the MONTANA STATE LIBRARY provides comprehensive access to information about Montana's natural resources to all Montanans through the acquisition, storage, retrieval, and dissemination of that information in meaningful form.

NRIS is comprised of:

- MONTANA NATURAL HERITAGE PROGRAM: The Montana Natural Heritage Program maintains a computer-assisted inventory of Montana's biological resources, emphasizing rare or endangered plant and animal species and biological communities.

- MONTANA WATER INFORMATION SYSTEM (WIS): Montana Water Information System is the starting point for locating water resources information in Montana, such as data on surface water, groundwater, water quality, riparian areas, water rights, climate data and more.

- GEOGRAPHIC INFORMATION SYSTEM: The Montana Geographic Information System (GIS) provides technical and data acquisition assistance for statewide GIS projects and to agencies developing in-house GIS capability. NRIS inventories available GIS data and coordinates GIS data standards and sharing throughout the state.

What's New page 12/22/95 NEW

Montana State Library Home Page
Montana Maps
NRIS Hot List
State of Montana Home Page

See our server's statistics

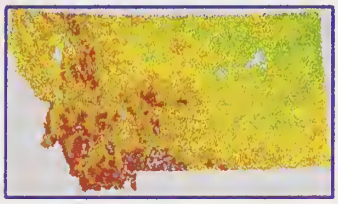
Contact: Allan Cox, Director, Montana Natural Resource Information System, 1515 East Sixth Avenue, Helena, Montana 59620-1800, (406) 444-5355 Phone, (406) 444-0581 Fax

Or Send comments to acox@nris.msl.mt.gov

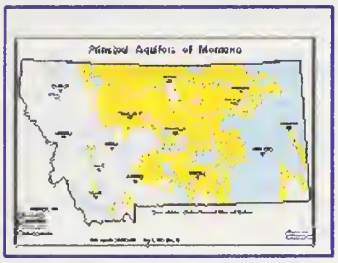
The Montana Water Information System

A component of the Montana Natural Resource Information System

The Water Information System is a clearing house and referral service linking users with the best available sources of information. The System provides access to all types of water information including surface water, ground-water, water quality, precipitation, snow pack, water rights.



Montana Color Shaded Relief Image



Montana Hydro-Geologic Unit Map Image

Data Services

The primary goal of the Water Information System is to provide users with information from important water data sources and provide the information in a usable format. Water Information staff provide Data Search and retrieval services, and data conversion and reformatting for use in other software products.

Water Data Sources

The Water Information System accesses a wide variety of state, national, and international water databases on behalf of data users. In addtion, any data residing on the NRIS Geographic Information System (GIS) relating to water resources are available to help meet users needs. Most data users can obtain data at no cost, see Access Guidlides and WIS Data Sources List for more information.

Active Links to Water Information for Montana

Statewide Water Data Coverages

- Map of Montana's Hydrography

Future plans call for installation of a large network browsable file server for easier and faster access to all NRIS databases. Some statewide databases are available now via anonymous ftp or http as Arc/Info export files or GIS images.

Special Projects

The Water Information System also provides support through service contracts for special projects related to water data management, water management, and water resource monitoring. Projects utilize NRIS's expertise and capabilities in developing data base systems, user interface softare, and GIS tools and map products. Active projects include:

Montana Drought Monitoring (Includes GIF Drought Map Images)

Using GIS to Support Volunteer Water Monitoring Projects

Montana Rivers Information System - COMING SOON

Montana Ground Water Atlas (Includes GIF Map Images) - COMING SOON

For more information or to place an information request contact:

Jim Stimson, WIS Coordinator
Montana State Library
1515 East Sixth Avenue
Helena, Montana 59620-1800

(406) 444-5356 Phone
(406) 444-0581 Fax
jstimson@nris.msl.mt.gov

or

Val Jaffe, Water Information Specialist
Montana State Library
1515 East Sixth Avenue
Helena, Montana 59620-1800

(406) 444-3345 Phone
(406) 444-0581
vjaffe@nris.msl.mt.

Montana Natural Resource Information System Home Page
